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Title: "First Light" Experimental Results: Notes on Progress

Author(s): Swift, Alicia L.
Schirato, Richard C.

Intended for: Provide notes on progress to my advisor at the University of Tennessee

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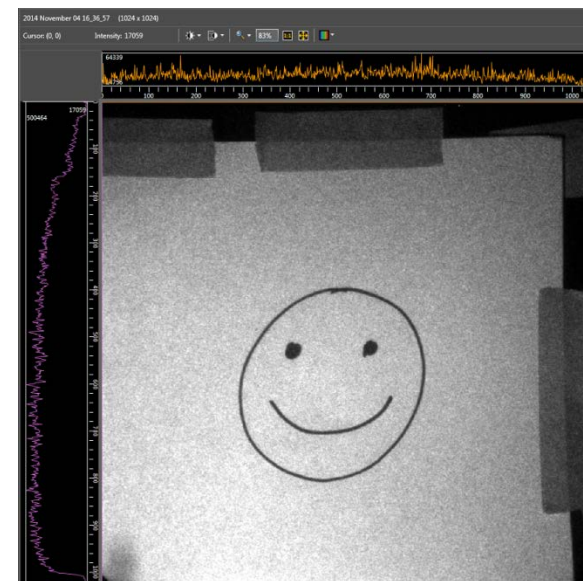
“First Light” Experimental Results: Notes on Progress

Alicia L. Swift, Richard C. Schirato

November 5, 2014

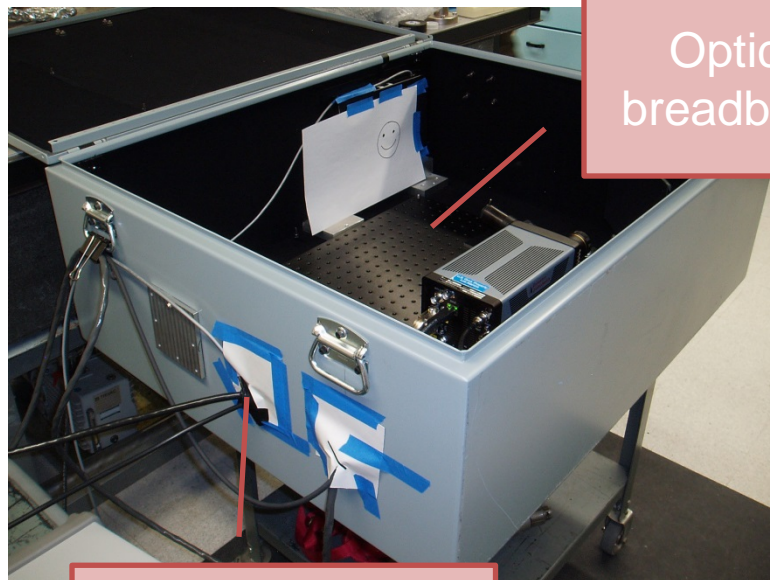
First Light Experiment

1. 10/31/14: Turn on camera and get image of room with ambient light
2. 11/4/14: Obtain image of smiley face “object” using external triggering
 - Determined light source is 15ns slower than CCD camera, have to delay signal accordingly
 - 75mm Edmund Optics lens, aperture of f/4
 - Light source ~6” from object
3. 11/4/14: Adjust focus lens, increase image exposure to increase image resolution (see image at right)
 - 1 frame, 10k on-CCD accumulations, 15 exposures per frame (images averaged with LightField, the camera software, to obtain image at right)
 - 50mm Edmund Optics lens, aperture of f/2
 - Light source ~12” from object



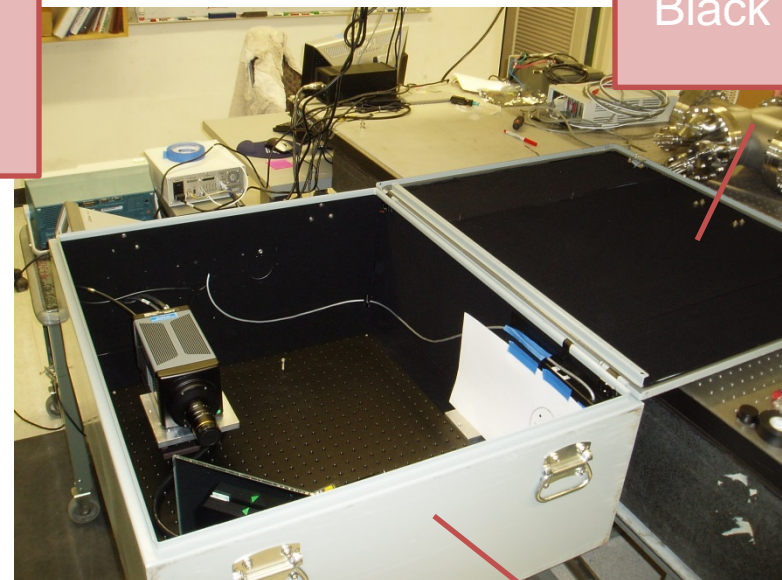
Photos: The Light-Tight Box

- To absorb internally scattered light, the light-tight box and metal components were covered with black felt or painted black
- Optical breadboard in bottom of box has spacing = 1"



Optical breadboard

Cable exits covered with felt from the outside

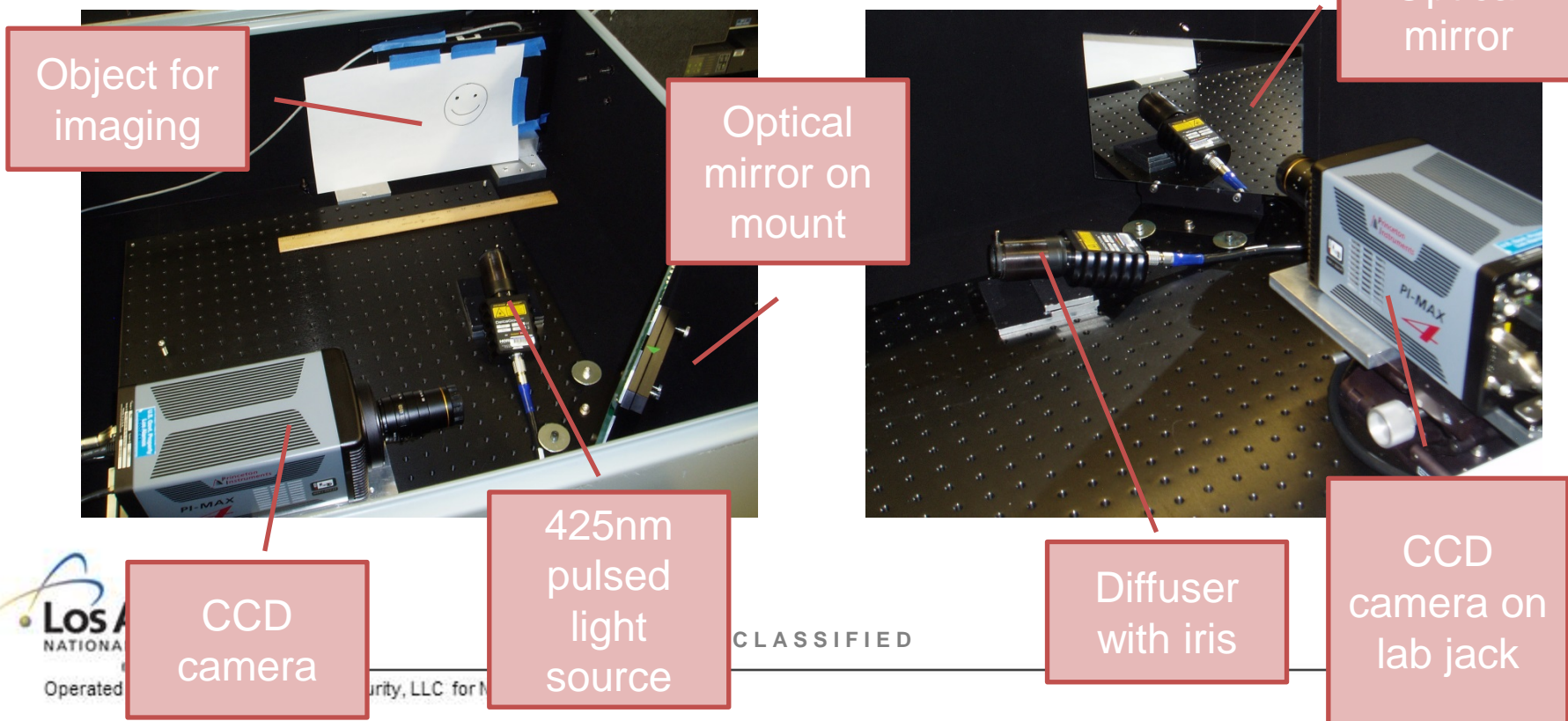


Black felt

Light-tight box

Photos: Inside the Box

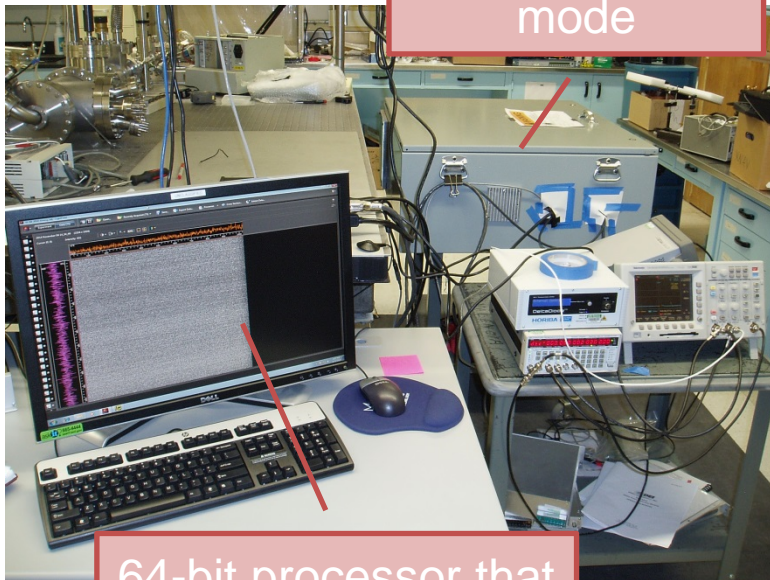
- Smiley face “object” illuminated by pulsed light source
 - In later experiments, the smiley face will be replaced by a scintillator screen (8”x8”) and the object being imaged will move to a location outside the box. The camera and mirror will remain in similar locations.



Photos: Electronics

- Electronic equipment

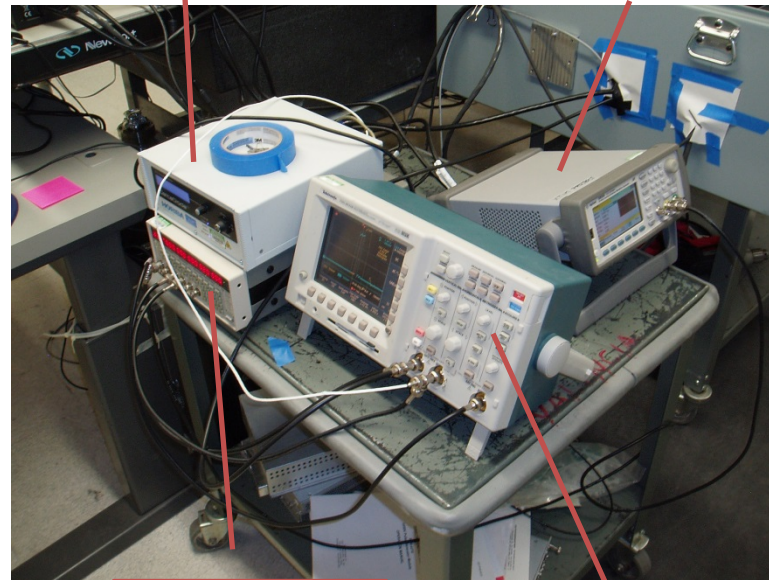
Light-tight box
in experimental
mode



64-bit processor that
controls camera &
light source (screen
showing BG image)

Light
source
controller

Waveform
generator
in pulser
mode



Delay
generator

O-scope

Equipment Information

- Agilent 33522A waveform generator operated in pulser mode
 - 10kHz, 200ns pulse width (PW), 2.5 V amplitude, 8.4 ns leading/trailing edges
- Stanford Research delay generator
 - Horiba: 20ns PW (5 ns delay, 20 ns width)
 - Princeton Instruments: 20ns PW (20 ns delay, 5 ns width)
- Horiba Scientific DeltaDiode 425nm LED light source
 - 10kHz, 0 bias, 209 amplitude, 25°C, 1.5 V trigger threshold
- Princeton Instruments PI-Max 4
 - 1 frame with 1 exposure per frame, intensifier gain=10, ADC gain=50, 1024x1024 pixels (full frame), 0°C, 1.5 V trigger threshold (rising edge trigger), DC, 50ohm termination, gate delay of 36 ns (minimum for camera)
 - Edmund Optics 50mm lens, f/2 aperture, C-mount

